

# **Senior 1 Mathematics Standards Test**

## **Administration Information for Supervising Teachers**

**January 2005**

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## Preface

As announced in the May 2004 letter regarding Provincial Assessment and Standards Testing Schedule <[www.edu.gov.mb.ca/ks4/assess/testingdates\\_2004-2005.pdf](http://www.edu.gov.mb.ca/ks4/assess/testingdates_2004-2005.pdf)> Manitoba Education, Citizenship and Youth is in the process of phasing out standards tests at the Grade 6 and Senior 1 levels. This year the Senior 1 Mathematics Standards Test is available for classroom use. It was developed in collaboration with teachers from across the province and is based on the *Senior 1 Mathematics: Manitoba Curriculum Framework of Outcomes and Senior 1 Standards* (1997).

All schools have been provided with one copy of this test. Schools are responsible for photocopying all necessary materials required for the administration of the test. The responsibility for marking these tests lies solely with the schools or divisions who wish to administer the test; the department will not be providing financial support.

This "Administration Information" booklet has been compiled to provide support to those teachers who wish to administer the Senior 1 Mathematics Standards Test in the manner intended. The guidelines in this booklet should be observed to ensure the consistency of the test administration and comparability if wishing to analyse results over time or across schools.

Should you have any questions about the administration or the marking of this test please contact Ken Horton, Assessment Consultant, at 945-2576 or toll-free at 1 800 282-8069, extension 2576.



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## General Information

### Features of the test

Please be aware of the following features of the Senior 1 Mathematics Standards Test—January 2005:

- the test is designed to be administered in one session of 2 hours with an additional 30 minutes if requested by the student and at the discretion of the classroom teacher;
- the two curricular choices, Choice I and Choice II, will be contained in the same test booklet;
- the test will contain both selected-response and constructed-response items;
- among the constructed-response items, the test will include “open-response” items which will be scored according to the Standards-Based General Scoring Rubrics (4-mark and 6-mark) found in the *Marking Guide*;
- English or French versions of the test will be available for students enrolled in Senior 1 Mathematics and “Mathématiques de secondaire 1”; and
- the test is designed to assess student achievement relative to end-of-semester learning outcomes, and so is intended to be administered near the end of the semester.

### Test schedule

The following table summarizes the schedule for the Senior 1 Mathematics Standards Test:

| Preparation Time                        | Time Required for Test          |
|-----------------------------------------|---------------------------------|
| 15 minutes preparation and instructions | 2 hours + 30 minutes (optional) |

The total writing time for each session is 120 minutes plus 15 minutes for preparation and instructions. Additional writing time of 30 minutes is permissible if needed.

### Student materials

Students may use the following materials during the Senior 1 Mathematics Standards Test:

- scientific calculators;
- HB pencils;
- manipulative materials, such as algebra tiles, cubes and tracing paper;
- geometry sets;
- rulers; and
- erasers.

Students are not permitted to exchange materials during the test.

The following materials should **not** be used during the test:

- classroom notes, classroom textbooks, and other such materials;
- subject-related materials on display;
- dictionaries or translation resources of any kind; and
- graphing calculators.

## **Students leaving the room**

Students should be expected to remain in the room for a minimum of 60 minutes from the start of the test or the entire session.

However, any student who must leave and re-enter the room should be accompanied by a replacement supervisor. This practice ensures that the supervising teacher can remain in the test room with the students at all times.

## **Late arrivals**

To avoid the opportunity for student discussion of test questions during the administration of the test, students may not enter the test room after the first hour of writing.

Students, who arrive late, but within the first hour of the test, may be allowed additional time corresponding to the amount by which the student was late.

## **Responding to student questions**

Avoid making any directing/guiding comments during the test, other than those required for distribution of materials and instructions to students.

No explanations, translations, rephrasing, clarifying statements or comments of a similar nature may be provided about the test content. Supervising teachers can, however, provide clarification regarding test taking rules or procedures.

If a student asks a question related to test content, a suggested response is, "I'm sorry. I can't answer your question. Do your best with it."

Please contact Ken Horton, Assessment Consultant, at 945-2576 or toll-free at 1 800 282-8069, extension 2576 to report any suspected errors in printing or wording prior to any discussion with students.

## **Violation of rules**

The *Standards Test Session Rules* are read aloud to students by the supervising teacher immediately before the test (see Appendix 1, p. 7). Should a violation of rules occur, the student is permitted to complete the test. The consequences of a violation of rules are a local decision. Note, however, that cheating and plagiarism result in a standards test mark of 0%.

# Responsibilities of Supervising Teachers

Supervising teachers administer the test using the step-by-step procedures outlined in the following section.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Advance preparations</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <ul style="list-style-type: none"><li>• Ensure that all subject-related materials have been removed from the walls and boards.</li></ul>                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"><li>• Ensure that a replacement supervisor is available to accompany students who must temporarily leave the room during the test.</li></ul>                                                                                                                                                                                                                                                                                    |
| <ul style="list-style-type: none"><li>• Notify students in advance of the:<ul style="list-style-type: none"><li>– time, location and duration of each test session;</li><li>– materials needed to write the test;</li><li>– <i>Standards Test Session Rules</i> (see Appendix 1, page 7);</li><li>– list of <i>Directing Words</i> (see Appendix 2, page 8); and</li><li>– requirement to remain in the test room for the initial 60 minutes.</li></ul></li></ul> |
| <ul style="list-style-type: none"><li>• Students may not bring anything produced outside of class into the test session.</li></ul>                                                                                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"><li>• Ensure that you have extra supplies and that there is a functioning pencil sharpener and stapler in the room. Students must not exchange materials during the test.</li></ul>                                                                                                                                                                                                                                             |
| <b>Prior to test session</b>                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <ul style="list-style-type: none"><li>• Ensure that you have access to the following test materials:<ul style="list-style-type: none"><li>– <i>Student Response Booklets</i>;</li><li>– extra copies of test booklets; and</li><li>– <i>Administration Information for Supervising Teachers</i> (this document).</li></ul></li></ul>                                                                                                                              |
| <ul style="list-style-type: none"><li>• Arrange the desks so they are spaced as far apart as possible.</li></ul>                                                                                                                                                                                                                                                                                                                                                  |
| <ul style="list-style-type: none"><li>• Make arrangements per school policy to ensure that students who are exempted from writing the test are accommodated in an alternate setting.</li></ul>                                                                                                                                                                                                                                                                    |
| <b>Beginning the test session</b>                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"><li>• Distribute <i>Student Response Booklets</i>.</li></ul>                                                                                                                                                                                                                                                                                                                                                                    |
| <ul style="list-style-type: none"><li>• Read aloud <i>Standards Test Session Rules</i> to students (Appendix 1, page 7).</li></ul>                                                                                                                                                                                                                                                                                                                                |
| <ul style="list-style-type: none"><li>• Read aloud the <i>Points to Remember</i> to students (page iii in the test booklet, and reproduced in Appendix 3, page 9 in this document).</li></ul>                                                                                                                                                                                                                                                                     |
| <ul style="list-style-type: none"><li>• Remind students to:<ul style="list-style-type: none"><li>– pace themselves in writing the test; and</li><li>– check over their work to ensure that all questions have been attempted.</li></ul></li></ul>                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"><li>• Tell students to complete common items and Choice I <b>OR</b> common items and Choice II.</li></ul>                                                                                                                                                                                                                                                                                                                       |

|                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>During the test session</b>                                                                                                                                 |
| <ul style="list-style-type: none"><li>• Remain in the classroom throughout the entire test session.</li></ul>                                                  |
| <ul style="list-style-type: none"><li>• Half-way through the test session, advise students of the amount of time remaining by writing it on a board.</li></ul> |






|                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ending the test session</b>                                                                                                                                 |
| <ul style="list-style-type: none"><li>• Collect test booklets from each student ensuring that each booklet has the necessary student identification.</li></ul> |

# Appendices



## Appendix 1: Standards Test Session Rules

The supervising teacher should read these rules aloud to students at the beginning of the Senior 1 Mathematics Standards Test:

- During the test session, do not proceed until instructed to do so.
- If you notice that your test booklet is damaged or improperly printed, please raise your hand, and I will give you another test booklet.
- You are expected to remain in the test room for one hour.
- To write the test you should only have a scientific calculator, a HB pencil, a geometry set, a ruler, and an eraser. You may also have manipulative materials. No other materials are permitted. Do not exchange test materials. A formula page is provided.
- You may not help another student. You should not get help from another student. If you need anything during the test, raise your hand and I will come to you.
- During the test I can help you with the directions, but I will not be able to help you with the test questions.
- When I ask you to stop writing, put your pencil down immediately.
- You may not throw away any materials. Any extra paper used must be stapled in your test booklet. You may **not** leave the room with any test materials.

**If you do not understand any of these rules, raise your hand and I will explain them again.**

## Appendix 2: Directing Words

Students should be prepared to answer questions containing the following directing words:

| The word               | The question is asking for...                                                                                                        |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| create                 | an idea or object that you have made up                                                                                              |
| justify/support/verify | an explanation, information or evidence that shows why your method, idea or answer is good                                           |
| explain                | words or symbols, diagrams, charts or graphs, or other methods that <b>make clear</b> what you mean or what you are thinking         |
| illustrate/sketch      | a reasonably neat picture or diagram (not necessarily to scale) that shows or explains an idea or method                             |
| model                  | a sketch that shows an idea; a type of explanation                                                                                   |
| assumption             | anything or any condition that is not given in the question but that you have supposed or invented to find the answer to the problem |
| generalisation         | a general idea, statement, rule or principle that relates an answer or conclusion to other similar situations                        |

## Appendix 3: Points to Remember

Formulas are given on the “**Formulas**” page in the *Student Response Booklet* (page iii) or with the question when needed.

Diagrams are not drawn to scale unless indicated otherwise.

**The total time allowed for writing the test is 150 minutes (120 minutes plus 30 minutes extra time, which your teacher may allow if you need it).**

- Work alone on this test.
- You may use a scientific calculator. All other electronic aids are not allowed.
- You may use models or other manipulative materials, including tracing paper.
- Notes, notebooks or textbooks may not be used during the test.
- You may use blank scrap paper but it must be handed in at the end of the test. You may do rough work anywhere in this booklet.

**If you need more space to answer a question, you may use an extra page provided by your teacher. Write your name or Booklet ID number and question number on any extra page(s) used. Staple the page(s) into your booklet where your answer begins.**



*Student identification:*

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**SENIOR 1  
MATHEMATICS  
STANDARDS TEST**

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**Student Response  
Booklet  
Choice I and Choice II**

**January 2005**

**Manitoba** 

*Building for the Future*

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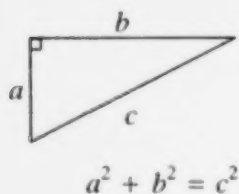
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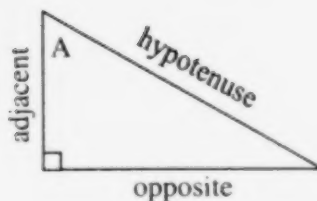
# SENIOR 1 MATHEMATICS

## FORMULAS

### Pythagorean Theorem



### Trigonometric Ratios

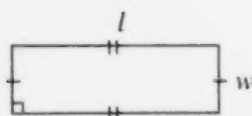


$$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan A = \frac{\text{opposite}}{\text{adjacent}}$$

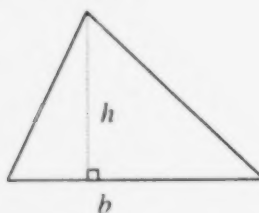
### rectangle



$$A = lw$$

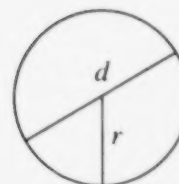
$$P = 2l + 2w$$

### triangle



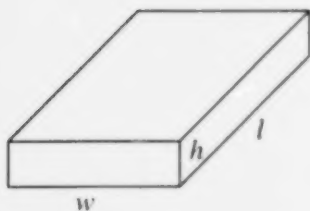
$$A = \frac{bh}{2}$$

### circle



$$A = \pi r^2$$

$$C = 2\pi r \quad C = \pi d$$



$$\text{Volume} = lwh$$

Surface Area = Total area of all faces of a 3-D object.

# SENIOR 1 MATHEMATICS STANDARDS TEST

## **POINTS TO REMEMBER**

Formulas are given on the “**Formulas**” page on the other side of this page or with the question when needed.

Diagrams are not drawn to scale unless indicated otherwise.

**The total time allowed for writing the test is 150 minutes (120 minutes plus 30 minutes extra time which your teacher may allow if you need it).**

- Work alone on this test.
- You may use a scientific calculator. All other electronic aids are not allowed.
- You may use models or other manipulative materials, including tracing paper.
- Notes, notebooks or textbooks may not be used during the test.
- You may use blank scrap paper but it must be handed in at the end of the test. You may do rough work anywhere in this booklet.

**If you need more space to answer a question, you may use an extra page provided by your teacher. Write your name or Booklet ID number and question number on any extra page(s) used. Staple the page(s) into your booklet where your answer begins.**

**DESCRIPTION—COMMON ITEMS AND CHOICE I (Spatial Geometry)**

**Total possible marks: 68**

**Time: 120 minutes**

**This test consists of 2 parts:**

| <b>Part</b> | <b>Description</b>                                                                | <b>Suggested Time<br/>(minutes)</b> | <b>Marks</b> |
|-------------|-----------------------------------------------------------------------------------|-------------------------------------|--------------|
| <b>A</b>    | <i>Selected-response questions:</i> worth one mark each.                          | 40                                  | 25           |
| <b>B</b>    | <i>Constructed-response questions:</i> mark value is indicated for each question. | 80                                  | 43           |

**DESCRIPTION—COMMON ITEMS AND CHOICE II (Transformational Geometry)**

**Total possible marks: 68**

**Time: 120 minutes**

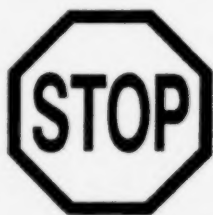
**This test consists of 2 parts:**

| <b>Part</b> | <b>Description</b>                                                                | <b>Suggested Time<br/>(minutes)</b> | <b>Marks</b> |
|-------------|-----------------------------------------------------------------------------------|-------------------------------------|--------------|
| <b>A</b>    | <i>Selected-response questions:</i> worth one mark each.                          | 40                                  | 25           |
| <b>B</b>    | <i>Constructed-response questions:</i> mark value is indicated for each question. | 80                                  | 43           |

**DIRECTIONS FOR PART A: SELECTED-RESPONSE QUESTIONS**

(Suggested Time: 40 minutes)

- Read each question carefully.
- Choose the best response.
- Each question should take no more than about two minutes to answer. If a question is taking too long to answer, come back to it later.

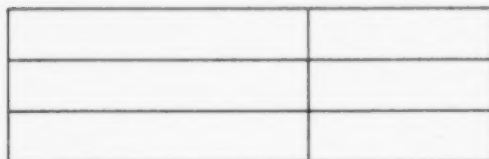


**PLEASE WAIT UNTIL THE TEACHER TELLS YOU TO TURN THE PAGE.**

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**PART A**  
**SELECTED-RESPONSE QUESTIONS**

1. What is the total number of rectangles (of any size) in this diagram?

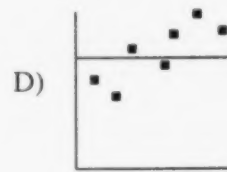
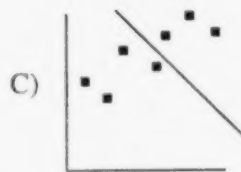
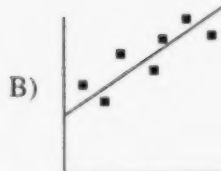
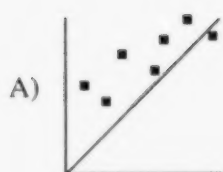


- A) 14                      B) 16                      C) 18                      D) 20
2. James is cycling from Winnipeg to Brandon, a total distance of 195 km.  
On the first day he cycles  $\frac{1}{3}$  of the total distance.  
On the second day he cycles 0.4 of the total distance.  
How many kilometres will he have to cycle **on the third day** to reach Brandon?
- A) 52 km                      B) 59 km                      C) 78 km                      D) 91 km
3. Which statement describes the relationship in the following scatterplot?

- A) linear relationship  
B) no relationship  
C) positive relationship  
D) negative relationship



4. Which of the following represents the line of best fit for the scatterplot below?



5. Which of the following numbers is **not** an *integer*?

A)  $-8$

B)  $\frac{-2}{3}$

C)  $0$

D)  $9$

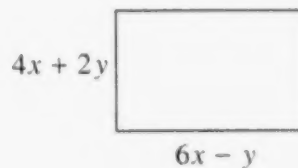
6. Which of the following expressions represents the **perimeter** of the rectangle?

A)  $10x + y$

B)  $20x + 2y$

C)  $20x - 6y$

D)  $24x^2 + 8xy - 2y^2$



7. Multiply:  $4a(3b - 5)$

A)  $-8ab$

B)  $7ab - 5$

C)  $12ab - 5$

D)  $12ab - 20a$

8. Which of the following equations are equivalent?

(i)  $6x - 4 = 8$

(ii)  $x + 2x + 2 = 8$

(iii)  $-x + 1 = -7x + 13$

A) i, ii, iii

B) i, ii

C) i, iii

D) ii, iii

9. Which of the following expressions has the greatest value when  $x = -1$ ?

A)  $3x$

B)  $3 - x$

C)  $3 + x$

D)  $\frac{3}{x}$

10. Solve the following equation:  $2(x - 3) = 3(3x + 12)$

A)  $x = -6$

B)  $x = -\frac{15}{7}$

C)  $x = \frac{30}{11}$

D)  $x = 6$

11. A weather forecaster states that there is a 40% probability of snow tomorrow. Which of the following statements is correct?

A) The probability that it will snow is greater than the probability it will not snow.

B) There is a 60% probability it will not snow.

C) There is a  $\frac{2}{5}$  probability it will not snow.

D) There is a  $\frac{1}{4}$  probability it will snow.

12. Julie creates a "user password" made up of 3 items:

\_\_\_\_\_

a letter of the alphabet

\_\_\_\_\_

a digit from 0 to 9

\_\_\_\_\_

one of these 3 symbols  
\* Δ #

What is the probability of guessing Julie's password correctly?

A)  $\frac{1}{3}$

B)  $\frac{3}{39}$

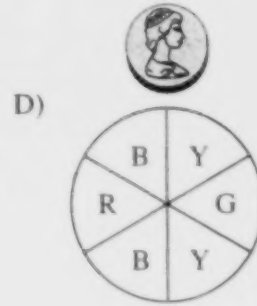
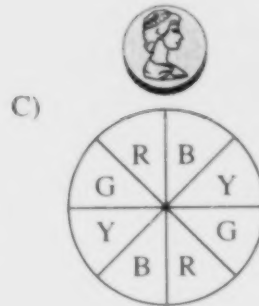
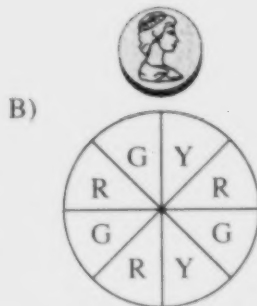
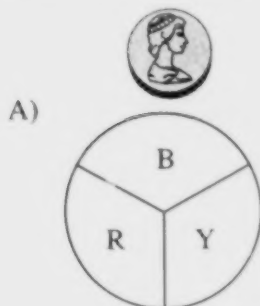
C)  $\frac{1}{39}$

D)  $\frac{1}{780}$

13. Dennis tosses a coin and spins a spinner once.

Which diagram represents a  $\frac{1}{8}$  probability of getting a red and a head?

|        |   |
|--------|---|
| Blue   | B |
| Red    | R |
| Yellow | Y |
| Green  | G |



14. The value of the numerical coefficient in  $-x^4 + 3$  is:

- A) -1  
B) 3  
C) 4  
D) there is no numerical coefficient

15. Which of the following powers has a value of 8?

- A)  $2^3$       B)  $2^4$       C)  $4^2$       D)  $8^0$

16. To simplify the following expression, what must be done with the exponents?

$$\frac{10^{3x} \cdot 10^{2x}}{10^x}$$

- A)  $(3x)(2x) \div x$       B)  $(3x)(2x) - x$       C)  $(3x + 2x) - x$       D)  $(3x + 2x) \div x$

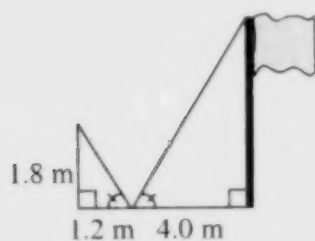
17. Divide:  $\frac{9ab - 12ac + 6a}{-3a}$

- A)  $-3b - 12ac + 6a$   
B)  $-3b + 4c - 2$   
C)  $6b - 9c + 3$   
D)  $3b - 4c + 2$

18. Neptune is  $4.5 \times 10^9$  km from the sun while Venus is only  $1.08 \times 10^8$  km away from the sun.  
How many times farther from the sun is Neptune than Venus?

- A) 0.42      B) 4.2      C) 42      D) 420

19. Calculate the height of the flagpole.



- A) 18.5 m      B) 6.0 m      C) 4.6 m      D) 2.7 m

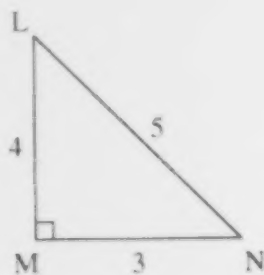
20. Which trigonometric ratio is correct for the following diagram?

A)  $\sin L = \frac{3}{4}$

B)  $\sin N = \frac{5}{4}$

C)  $\cos L = \frac{4}{5}$

D)  $\tan N = \frac{3}{5}$



21. If  $\sin A = 0.4325$ , find  $\angle A$ .

A)  $0.008^\circ$

B)  $0.4^\circ$

C)  $25.6^\circ$

D)  $64.4^\circ$

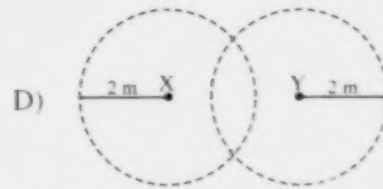
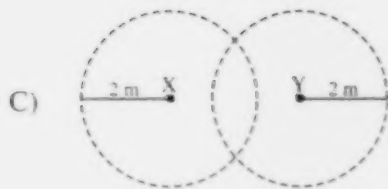
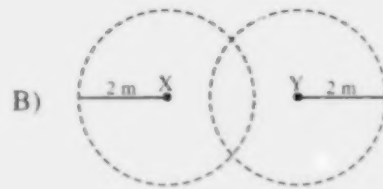
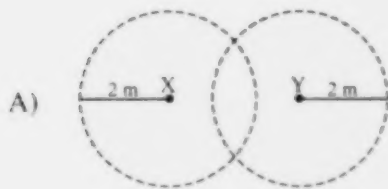
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**Complete Choice I on pages 9 and 10  
OR Choice II on pages 11–13.**

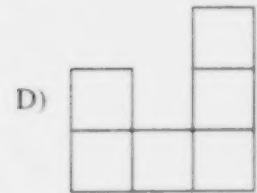
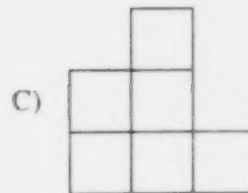
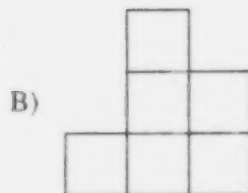
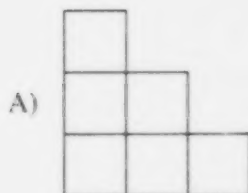
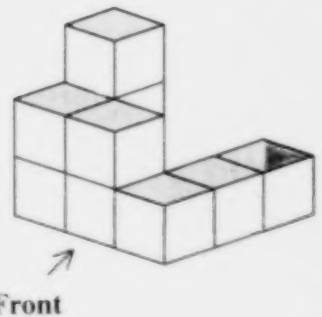
---

## CHOICE I: SPATIAL GEOMETRY

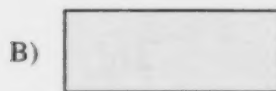
22. Which shaded area represents the locus of points less than 2 m from X **and** more than 2 m from Y.



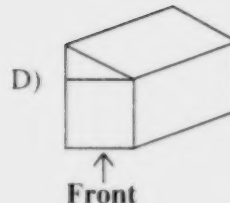
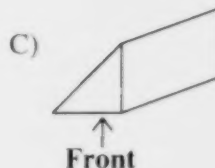
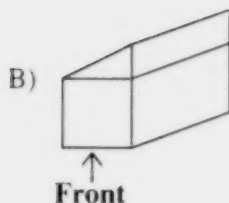
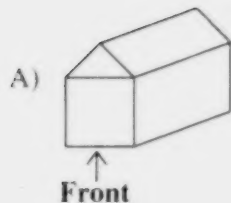
23. Which of the following views is the **left side view** of the structure shown?



24. A dog is tied to a leash that slides along a clothes line as shown in the diagram. Which locus of points best shows the region where the dog can walk?



25. Which model has the **back** elevation shown below?



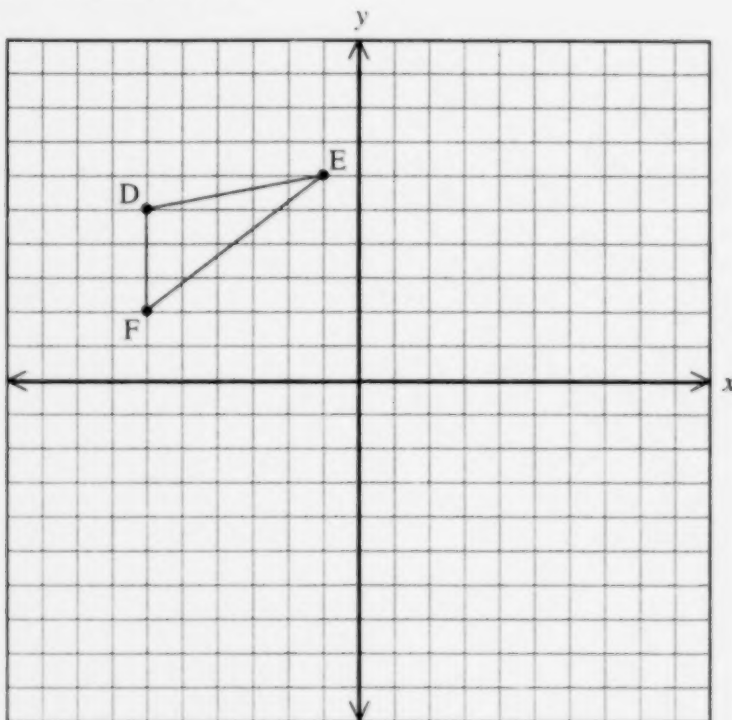
**End of Choice I Selected-Response Questions.**

**Now go to Part B: Constructed-Response Questions on page 15.**

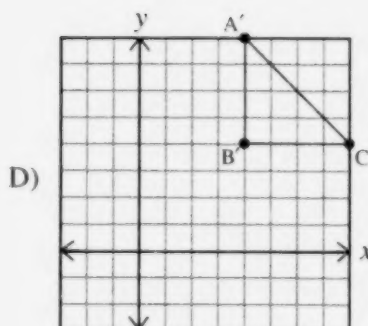
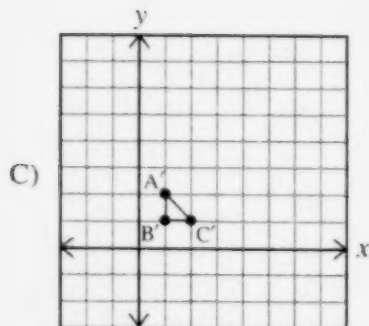
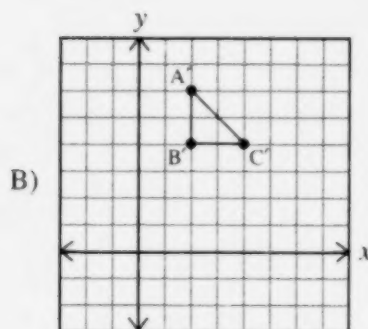
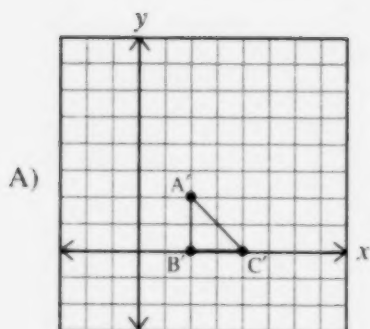
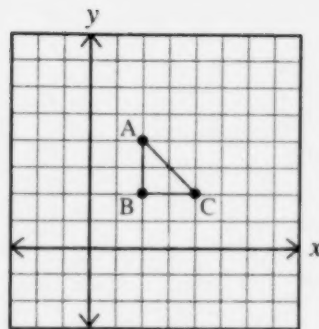
## CHOICE II: TRANSFORMATIONAL GEOMETRY

22.  $\triangle DEF$  is reflected in the  $y$ -axis and then translated 6 units down. What are the coordinates of the final image of  $F$ ?

- A)  $(0, -4)$
- B)  $(6, 2)$
- C)  $(-6, -8)$
- D)  $(6, -4)$



23. Given the mapping  $(x, y) \rightarrow \left(\frac{x}{2}, \frac{y}{2}\right)$ , which of the following represents the correct image for  $\triangle ABC$ ?



24.  $\triangle ABC$  is reflected in the  $x$ -axis.  
The resulting image will be:

A) similar but not congruent to  $\triangle ABC$   
B) congruent to  $\triangle ABC$   
C) not similar to  $\triangle ABC$   
D) a different size than  $\triangle ABC$

25. The single transformation that would represent a rotation of F is:

A)  $F \rightarrow E$

B)  $F \rightarrow E$

C)  $F \rightarrow D$

D)  $F \rightarrow D$

---

**End of Choice II Selected-Response Questions.**  
**Now go to Part B: Constructed-Response Questions on page 15.**

---

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## **DIRECTIONS FOR PART B: CONSTRUCTED-RESPONSE QUESTIONS**

(Suggested Time: 80 minutes)

Write your answers in the space provided with each question. If you need more space to answer a question, you may use an extra page provided by your teacher. Write your name or your Booklet ID number and question number on any extra page(s) used. Staple the page(s) into your booklet where your answer begins.

### **Directing Words**

Some questions may include directing words such as *explain*, *justify* and *create*. These words are explained below.

| <b>The word</b>        | <b>The question is asking for...</b>                                                                                                 |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| create                 | an idea or object that you have made up                                                                                              |
| justify/support/verify | an explanation, information or evidence that shows why your method, idea or answer is good                                           |
| explain                | words or symbols, diagrams, charts or graphs, or other methods that <b>make clear</b> what you mean or what you are thinking         |
| illustrate/sketch      | a reasonably neat picture or diagram (not necessarily to scale) that shows or explains an idea or method                             |
| model                  | a sketch that shows an idea; a type of explanation                                                                                   |
| assumption             | anything or any condition that is not given in the question but that you have supposed or invented to find the answer to the problem |
| generalization         | a general idea, statement, rule or principle that relates an answer or conclusion to other similar situations                        |

### **Suggestions for answering OPEN-RESPONSE QUESTIONS:**

- provide **complete answers**;
- let the mark values for each question guide you in answering it;
- provide good explanations and justifications; and
- use a systematic and well-organized method in communicating the answer.

**PART B**  
**CONSTRUCTED-RESPONSE QUESTIONS**

26. **OPEN-RESPONSE QUESTION**

101

- a) Continue the following pattern for 2 more rows.

1  
1 1  
1 2 1  
1 3 3 1

---

---

- b) Explain your pattern.

- c) Using the same first 4 rows, continue a different pattern and complete 2 more rows.

1  
1 1  
1 2 1  
1 3 3 1

---

---

- d) Explain your new pattern.

|         |
|---------|
| 4 marks |
|---------|

27. Choose a number of pencils for Patricia in the following situation:

Patricia has more than 5 pencils.

Chris has 3 times as many pencils as Patricia.

Patricia now gives Chris 5 pencils.

Chris then gives Patricia 3 times as many pencils as Patricia now has.

- a) Determine how many pencils Chris will have after the exchanges are made.

- b) If Patricia started with a **different number** of pencils, how would this affect the number of pencils Chris has after the exchanges are made?

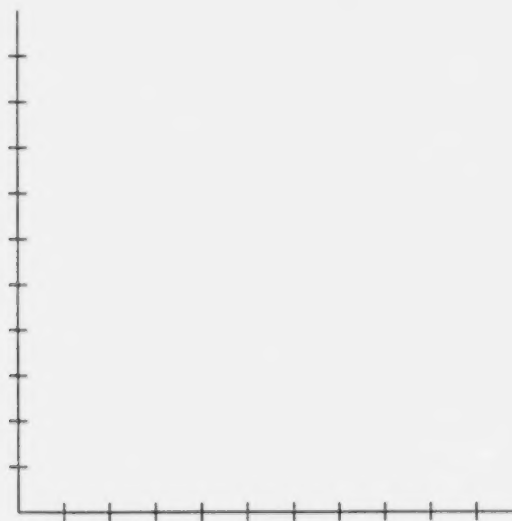
2 marks

## 28. OPEN-RESPONSE QUESTION

You have been asked to collect data to determine whether there is a relationship between the amount of time students spend playing sports and their test marks in Senior I Mathematics.

- a) You have decided to use a representative sample of 20 students.  
Explain how you would choose your sample.

- b) Create a scatterplot that compares the number of hours playing sports per week and students test marks in percentages. Label your scatterplot.



- c) What conclusion can you draw from your graph?

|         |
|---------|
| 4 marks |
|---------|

29. A researcher surveys high school students from one school.

He concludes that "80% of Manitobans believe that people should be able to have a driver's licence without restrictions at the age of 16".

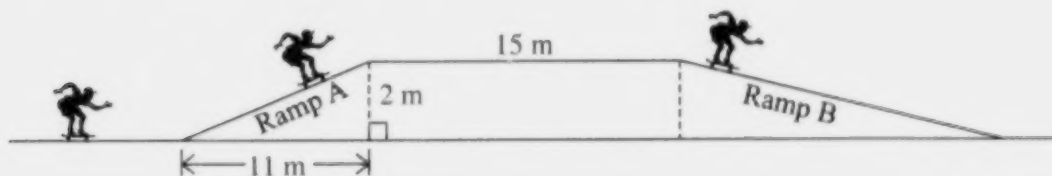
- a) Name 2 biases that may have affected this conclusion.

- b) Based on the researcher's survey, write a more valid conclusion.

3 marks

## 30. OPEN-RESPONSE QUESTION

A skateboard structure is shown below. Using the information on the diagram, answer the following questions. Show your work.



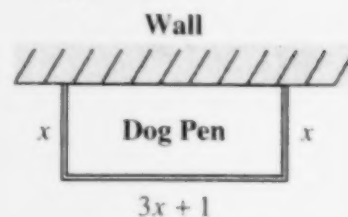
- What is the angle between ramp A and the ground?
- Choose an angle between ramp B and the ground which makes ramp B longer than ramp A.  
Use this angle to calculate the length of ramp B using trigonometry.
- What is the total distance the skateboard travels **from one end of the structure to the other end**?

6 marks

31. The total length of fence used to build three sides of a rectangular dog pen is 26 m.

106

- a) Write an equation to find the width ( $x$ ) of the pen.



- b) Solve your equation for  $x$ .

2 marks

32. Joan and Alex were asked to solve the same equation. Their solutions are shown below.

107

Joan

$$4(x + 2) - 3 = x + 2$$

$$4x + 2 - 3 = x + 2$$

$$4x - 1 = x + 2$$

$$4x - x = 2 + 1$$

$$3x = 3$$

$$x = 1$$

Alex

$$4(x + 2) - 3 = x + 2$$

$$4x + 8 - 3 = x + 2$$

$$4x + 5 = x + 2$$

$$4x - x = 2 + 5$$

$$3x = 7$$

$$x = \frac{7}{3}$$

- a) Explain Joan's error.
- b) Explain Alex's error.
- c) Show the correct solution.

3 marks

33. You see the following signs for two different raffles:

|                                                                                         |
|-----------------------------------------------------------------------------------------|
| <b>TEAM A RAFFLE</b><br>Prize – \$500<br>Tickets – \$2<br><br>Only 500 tickets printed! |
|-----------------------------------------------------------------------------------------|

|                                                                                          |
|------------------------------------------------------------------------------------------|
| <b>TEAM B RAFFLE</b><br>Prize – \$1000<br>Tickets – \$4<br><br>Only 300 tickets printed! |
|------------------------------------------------------------------------------------------|

- a) If you bought one ticket from each team, what is the probability that you will win both prizes? Assume that all tickets are sold. Show your work.
- b) You decide to buy from only one team. Taking probability into consideration, from which team would you buy your ticket?  
Justify your choice.

3 marks

34. Below are three of the questions Robert completed on a powers and exponents quiz.

- Correct any errors Robert may have made.
- Circle any question(s) simplified correctly.

6.  $(x^2)(x^4) = x^8$

7.  $\frac{x^8}{x^{-4}} = x^{12}$

8.  $(x^5)^2 = x^7$

3 marks

35. a) Simplify  $(x^2y)(4x^3y^3)$ .

110

b) If  $x = -2$  and  $y = 1$ , evaluate your expression in a).

|         |
|---------|
| 2 marks |
|---------|

36. a) Determine the values of  $x$ .

$$x^2 = 225$$

111

b) The area of a square patio is  $196 \text{ m}^2$ . Rahib is asked to find the length of the patio.

Rahib solves:

$$x^2 = 196$$

$$x = 14 \text{ or } -14$$

- So, the length of the patio is 14 or  $-14$ . Do you agree? Explain.

|         |
|---------|
| 2 marks |
|---------|

## 37. OPEN-RESPONSE QUESTION

- a) Write any rational number, any integer and any whole number whose sum is  $-7.45$ .

$$\begin{array}{c} \boxed{\phantom{000}} \\ \text{whole} \end{array} + \begin{array}{c} \boxed{\phantom{000}} \\ \text{integer} \end{array} + \begin{array}{c} \boxed{\phantom{000}} \\ \text{rational} \end{array} = -7.45$$

- b) • Give an example of a number that is not a rational number.  
• Explain why it is **not** rational.

4 marks

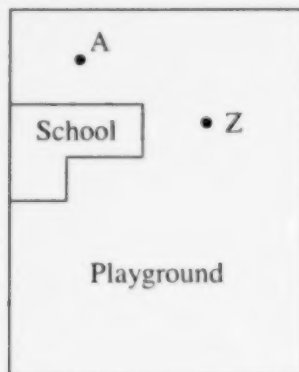
---

**Complete Choice I on pages 25 and 26  
OR Choice II on pages 27 and 28.**

---

**CHOICE I: SPATIAL GEOMETRY**

38. Mrs. Able (A) and Mr. Zane (Z) are on playground duty.  
Maria wants to find a place to hide from the 2 teachers.
- Shade the region(s) on the playground where Maria may hide.



2 marks

39. The following is the base plan of a 3-D model.

|   |   |   |
|---|---|---|
| 3 |   | 2 |
| 1 | 1 | 1 |
| 4 | 3 | 1 |

**Front**

- a) What is the total number of blocks you would see from the **right** view? \_\_\_\_\_
- b) Draw the **front** view of this model.
- c) Using 20 blocks show the base plan of a 3-D model that has the same front view as your answer in b).

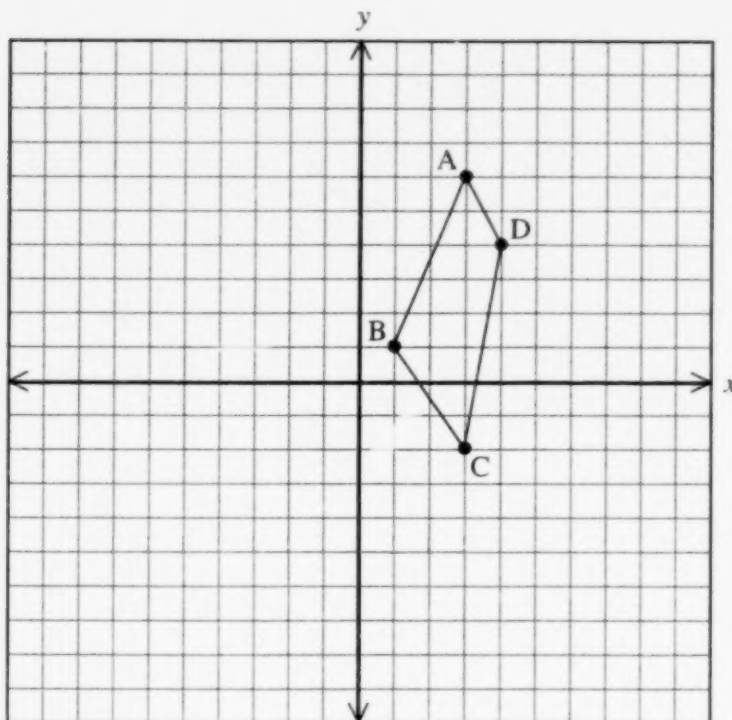
3 marks

**END OF TEST—CHOICE I**

**CHOICE II: TRANSFORMATIONAL GEOMETRY**

38.

113



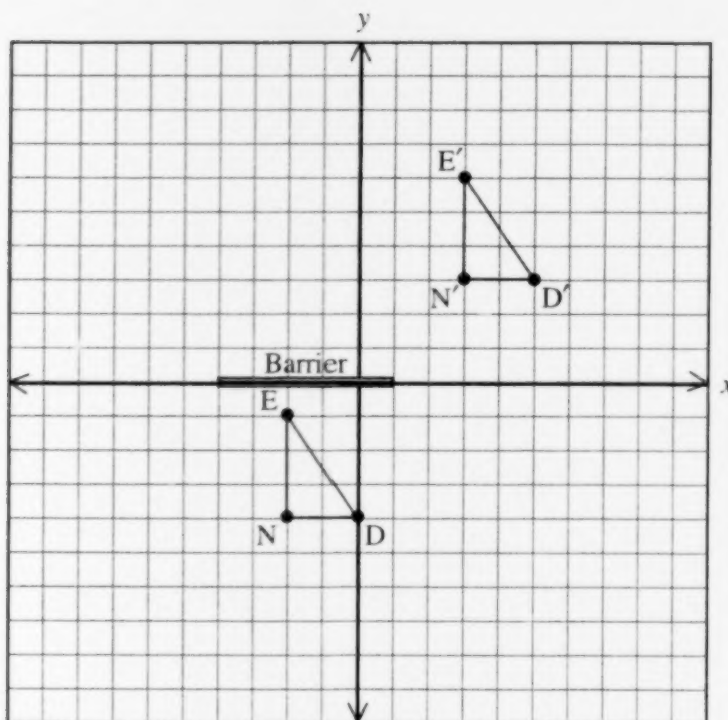
- a) **Draw** the image of the figure above rotated  $90^\circ$  counter-clockwise about point C.
- b) Write the coordinates for  $C'$ .

 $C'(\quad, \quad)$ 

- c) Describe another transformation that would result in the same image.

3 marks

39. a) Describe one or more **translations** of  $END$  that result in  $E'N'D'$  without crossing the barrier.



- b) Describe a combination of translations **and** reflections of  $END$  that results in the image  $E'N'D'$  without crossing the barrier.

2 marks

**END OF TEST—CHOICE II**

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# **SENIOR 1 MATHEMATICS STANDARDS TEST**

## **Marking Guide Choice I and Choice II**

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**January 2005**

**Manitoba** 

*Building for the Future*

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Manitoba Education, Citizenship and Youth,  
Assessment and Evaluation Branch,  
Winnipeg, Manitoba R3E 3J5

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# General Marking Instructions

## A. Scoring the Selected-Response Questions

Please follow the *Answer Key for Selected-Response Questions* on page 5 of this document.

## B. Scoring the Constructed-Response Questions

The respective marking key or scoring rubric should be used in conjunction with the *Senior 1 Mathematics: Manitoba Curriculum Framework of Outcomes and Senior 1 Standards* when assigning scores to student responses.

### B.1 Scoring Guidelines—Restricted-Response Questions (with or without Explanation)

Each question of this type is designed to elicit a well-defined response according to the associated specific outcome(s) and relevant mathematical processes. Their purpose is to determine whether a student meets the standards for the course (level 2) as they relate to the knowledge and skills associated with the question. **Scoring is in whole-mark intervals (there are no half-marks).**

To receive full marks, a student's response must be complete and correct. Partial marks may be awarded for a "relevant strategy" with execution errors. *A relevant strategy is defined as one that is consistent with the specific outcome(s) and mathematical processes associated with the question that, if properly executed, would lead to the correct answer.* Where alternative strategies are possible, the *Marking Key* makes mention of them

For some questions the *Marking Key* identifies errors that are "trivial". No marks are to be deducted for such errors. In order to be considered trivial, an error must be conceptually unrelated to the outcome(s) associated with the question and not lead to a mathematically incorrect answer. Such errors are distinct from minor errors (generally not conceptual in nature but leading to an incorrect answer) and major errors (an omission or error that is conceptual in nature).

### B.2 Scoring Guidelines—Open-Response Questions

These questions are designed to elicit student responses at any of the three levels of achievement defined in *Senior 1 Mathematics: Manitoba Curriculum Framework of Outcomes and Senior 1 Standards*. The rubrics contain the language of the curricular standards in order to facilitate scoring in a manner that is consistent with those standards. The recommended procedure for scoring student responses is as follows:

1. Read the relevant specific outcome(s) in *Senior 1 Mathematics Framework of Manitoba Outcomes and Senior 1 Standards*.
2. Read the possible solution(s) provided in this document.
3. Study the student exemplars provided and the rationales for the assigned scores.
4. Carefully view all of the student's response and decide which of the three levels of achievement ("exceptional understanding", "good understanding" or "limited understanding") best applies. Whether the response clearly fits into one category or straddles two, this process will narrow down the number of possible scores that can be assigned to the response.
5. Compare the features of the student's response with the general performance indicators accompanying the mark values and the specific performance indicators (criteria) contained in the rubric. Note that the specific performance indicators only typify a student's response in a given score category. An exact match is not anticipated.

### C. Assistance

If, during marking, any marking issue arises that cannot be resolved locally, please call Manitoba Education, Citizenship and Youth at the earliest opportunity to advise and/or seek assistance. If required, we will connect you to an advisor. Contact person: Ken Horton at 945-2576 (1 800 282-8069, extension 2576).

# SCORING GUIDELINES

## *Answer Key for Selected-Response Questions*



## Answer Key for Selected-Response Questions—Choice I

### Choice I

1. C
2. A
3. D
4. B
5. B
6. B
7. D
8. A
9. B
10. A
11. B
12. D
13. C
14. A
15. A
16. C
17. B
18. C
19. B
20. C
21. C
22. D
23. B
24. A
25. C

### Choice II

1. C
2. A
3. D
4. B
5. B
6. B
7. D
8. A
9. B
10. A
11. B
12. D
13. C
14. A
15. A
16. C
17. B
18. C
19. B
20. C
21. C
22. D
23. C
24. B
25. D



# SCORING GUIDELINES

## *Marking Key and Standards-Based Scoring Rubrics (including student exemplars)*

# Question No. 26

Specific Outcome: A.1 (OR)

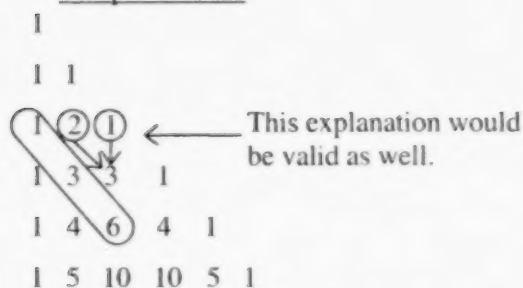
## QUESTION AND ANSWER KEY

### 26. OPEN-RESPONSE QUESTION

4 marks

- Continue the following pattern for 2 more rows.
- Explain your pattern.
- Using the same first 4 rows, continue a different pattern and complete 2 more rows.
- Explain your new pattern.

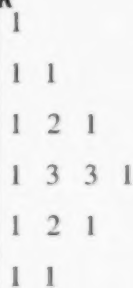
Sample answers:



This explanation would be valid as well.

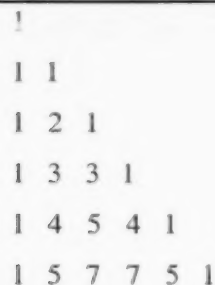
Each number (e.g., 3) is the sum of the two numbers above (Pascal's Triangle). **OR** Each number (e.g., 10) is the sum of the diagonal above starting with the number on top.

**OR**

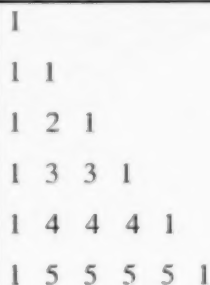


The numbers decrease so that the pattern is symmetrical.

**OR**

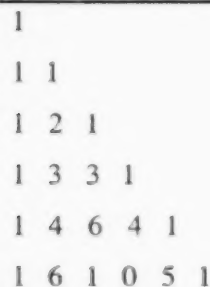


The numbers in the columns go up by 0, 1, 2, 3, 4, etc.



The numbers between the 1's go up by 1 in value and there is one more of them in each row.

**OR**



Each row forms a number that is a power of 11.

**OR** \_\_\_\_\_

To get the next row, you multiply the number formed by the last row by ten and you add that number to the number multiplied by ten.

**OR** \_\_\_\_\_

To get the next row, you multiply the number formed by the last row by eleven.

## Scoring Rubric

|                                             | Score and General Performance Indicators                                                                    | Specific Performance Indicators/Criteria |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <b>Level 1</b><br>limited understanding     | <b>1</b><br>weak attempt                                                                                    | - one criterion met                      |
| <b>Level 2</b><br>good understanding        | <b>2</b><br>reasonable strategy, minor errors and/or omissions                                              | - two criteria met                       |
|                                             | <b>3</b><br>response complete with one minor error or omission                                              | - three criteria met                     |
| <b>Level 3</b><br>exceptional understanding | <b>4</b><br>response complete, correct, showing insightful thinking, critical thinking, or a generalization | - all four criteria met                  |

### Criteria:

1. pattern created; must connect to the given numbers and lead to the prediction of the next row
2. reasonable explanation of pattern in a)
3. a different pattern created; must connect to the given numbers and lead to the prediction of the next row
4. reasonable explanation of pattern in b)

### Marker note(s):

- diagramming or highlighting numbers to illustrate the pattern is an acceptable explanation
- if there is no explanation, the pattern must be obvious to the marker for criteria 1 and 3 to be met
- a well explained pattern with one obvious trivial error in the pattern itself, deduct no marks

# EXEMPLARS

## 26. OPEN-RESPONSE QUESTION

- a) Continue the following pattern for 2 more rows.

$$\begin{array}{ccccccc}
 & & & & & & 1 \\
 & & & & & 1 & 1 \\
 & & & & 1 & 2 & 1 \\
 & & & 1 & 3 & 3 & 1 \\
 & & 1 & 4 & 6 & 4 & 1 \\
 \hline
 & 1 & 5 & 7 & 7 & 5 & 1
 \end{array}$$

- b) Explain your pattern.

The first and last columns are always one, but  
in the second column add 1 to the previous number,  
second column add 2, third column add 3

- c) Using the same first 4 rows, continue a different pattern and complete 2 more rows.

$$\begin{array}{ccccccc}
 & & & & & & 1 \\
 & & & & & 1 & 1 \\
 & & & & 1 & 2 & 1 \\
 & & & 1 & 3 & 3 & 1 \\
 & & 1 & 4 & 4 & 4 & 1 \\
 \hline
 & 1 & 5 & 5 & 5 & 5 & 1
 \end{array}$$

- d) Explain your new pattern.

Add the number in however many times and it goes up  
by 1 every time

4 marks

- criteria 1, 2, 3 and 4 met

4 marks

26. OPEN-RESPONSE QUESTION

- a) Continue the following pattern for 2 more rows.

$$\begin{array}{ccccccc}
 & & & & & & 1 \\
 & & & & & 1 & 1 \\
 & & & & 1 & 2 & 1 \\
 & & 1 & 3 & 3 & 1 & \\
 \hline
 & & 1 & 5 & 4 & 1 & \\
 \hline
 & & 1 & 7 & 5 & 1 & 
 \end{array}$$

- b) Explain your pattern.

In row 2 for each new line you add 1 to the old number.  
 In row 3 for each new line you add 2 to the old line and the others rows stay the same

- c) Using the same first 4 rows, continue a different pattern and complete 2 more rows.

$$\begin{array}{ccccccc}
 & & & & & & 1 \\
 & & & & & 1 & 1 \\
 & & & & 1 & 2 & 1 \\
 & & 1 & 3 & 3 & 1 & \\
 \hline
 & & 1 & 4 & 6 & 1 & \\
 \hline
 & & 1 & 5 & 9 & 1 & 
 \end{array}$$

- d) Explain your new pattern.

for row 2 I added 3 to the old numbers.  
 for row 3 I added 2 to the old number

3 marks

- criteria 1, 2, and 4 met

4 marks

26. OPEN-RESPONSE QUESTION

- a) Continue the following pattern for 2 more rows.

1  
 1 1  
 1 2 1  
 1 3 3 1  
1 4 4 4 1  
1 5 5 5 5 1

- b) Explain your pattern.

It is going up by one every  
 time.

- c) Using the same first 4 rows, continue a different pattern and complete 2 more rows.

1  
 1 1  
 1 2 1  
 1 3 3 1  
 \_\_\_\_\_  
 \_\_\_\_\_

- d) Explain your new pattern.

1 mark

- criterion 1 met

4 marks

## Question No. 27

Specific Outcome: A.1 (RR/E)

### ◆ Question

2 marks

Choose a number of pencils for Patricia in the following situation:  
Patricia has more than 5 pencils.  
Chris has 3 times as many pencils as Patricia.  
Patricia now gives Chris 5 pencils.  
Chris then gives Patricia 3 times as many pencils as Patricia now has.

- a) Determine how many pencils Chris will have after the exchanges are made.
- b) If Patricia started with a **different number** of pencils, how would this affect the number of pencils Chris has after the exchanges are made?

### ◆ Answer Key

a) 20

b) It has no effect on the number.

OR

It will always be 20.

### Marking Key

#### 2 marks:

- 1 mark for correct answer in a)
- 1 mark for reasonable explanation in b)

*Marker note(s):*

- in b), an answer of 20 is not acceptable

## Question No. 28

Specific Outcomes: B.1, B.3, B.4, B.5 and B.6 (OR)

### QUESTION AND ANSWER KEY

#### 28. OPEN-RESPONSE QUESTION

4 marks

You have been asked to collect data to determine whether there is a relationship between the amount of time students spend playing sports and their test marks in Senior 1 Mathematics.

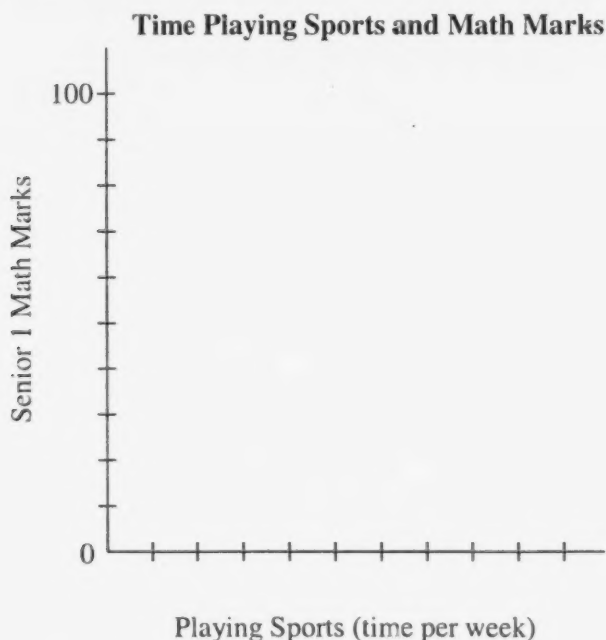
- a) You have decided to use a representative sample of 20 students.

Explain how you would choose your sample.

Possible answers:

- I would take a random sample from all the Senior 1 students in the school.
- I would choose 10 boys and 10 girls.
- I would choose \_\_\_\_\_ students from \_\_\_\_\_ Senior 1 classes.
- I would randomly choose from students who play sports.

- b) Create a scatterplot that compares the number of hours playing sports per week and students test marks in percentages. Label your scatterplot.



- c) What conclusion can you draw from your graph?

Answers may vary but should be consistent with the student's graph.

Possible answers:

- more time playing sports increases math marks—positive correlation
- more time playing sports decreases math marks—negative correlation
- time playing sports does not affect math marks—no relationship

## Scoring Rubric

|                                             | Score and General Performance Indicators                                                                           | Specific Performance Indicators/Criteria |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <b>Level 1</b><br>limited understanding     | <b>1</b><br><b>weak attempt</b>                                                                                    | - one criterion met                      |
| <b>Level 2</b><br>good understanding        | <b>2</b><br><b>reasonable strategy, minor errors and/or omissions</b>                                              | - two criteria met                       |
|                                             | <b>3</b><br><b>response complete with one minor error or omission</b>                                              | - three criteria met                     |
| <b>Level 3</b><br>exceptional understanding | <b>4</b><br><b>response complete, correct, showing insightful thinking, critical thinking, or a generalization</b> | - all four criteria met                  |

### Criteria:

1. a reasonable explanation in a)
2. dependent and independent variable correctly placed in b)
3. graph correctly labelled in b) by including two out of three of the following: title, correct scale, truncated if no zero
4. correct conclusion in c)

### Marker note(s):

- survey could include students in grades higher than Senior 1

# EXEMPLARS

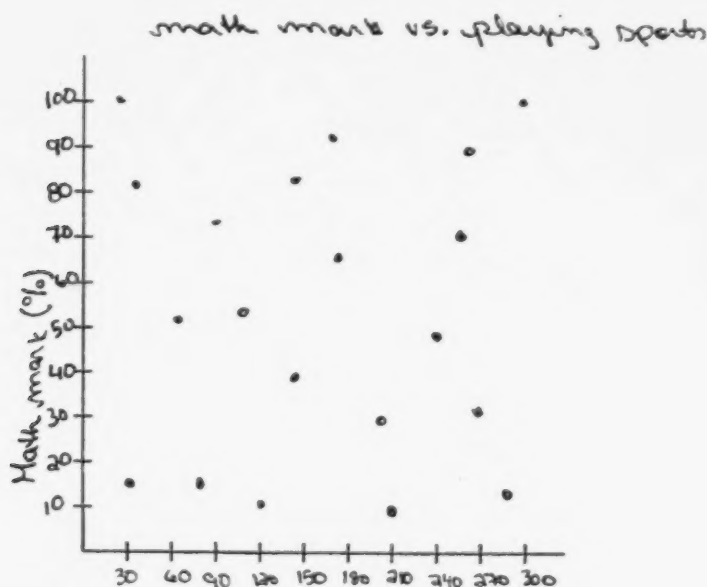
## 28. OPEN-RESPONSE QUESTION

You have been asked to collect data to determine whether there is a relationship between the amount of time students spend playing sports and their test marks in Senior 1 Mathematics.

- a) You have decided to use a representative sample of 20 students.  
Explain how you would choose your sample.

a random sample of students  
who play sports.

- b) Create a scatterplot that compares the number of hours playing sports per week and students test marks in percentages. Label your scatterplot.



- c) What conclusion can you draw from your graph?

there is no relationship between a student's  
math mark and the number of minutes  
a week they play sports

4 marks

- criteria 1, 2, 3 and 4 met

4 marks

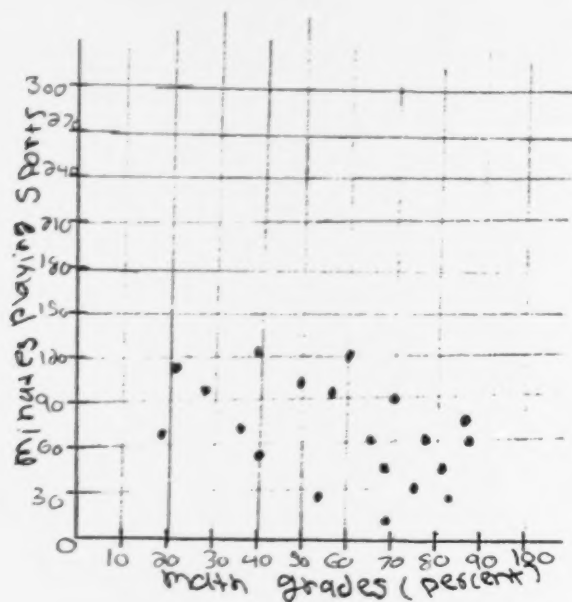
## 28. OPEN-RESPONSE QUESTION

You have been asked to collect data to determine whether there is a relationship between the amount of time students spend playing sports and their test marks in Senior 1 Mathematics.

- a) You have decided to use a representative sample of 20 students.  
Explain how you would choose your sample.

Students who are on school sport teams and  
Students who are not on Sport teams.

- b) Create a scatterplot that compares the number of hours playing sports per week and students test marks in percentages. Label your scatterplot.



- c) What conclusion can you draw from your graph?

That there isn't really a correlation, it depends on  
the effort that the student puts into their  
school work.

3 marks

- criteria 1, 3 and 4 met

4 marks

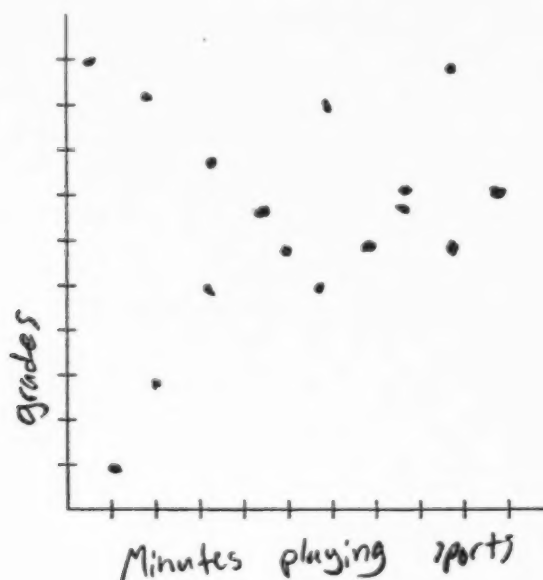
28. OPEN-RESPONSE QUESTION

You have been asked to collect data to determine whether there is a relationship between the amount of time students spend playing sports and their test marks in Senior 1 Mathematics.

- a) You have decided to use a representative sample of 20 students.  
Explain how you would choose your sample.

I would take 10 Random students who play on a team sport and  
10 Random students who don't play

- b) Create a scatterplot that compares the number of hours playing sports per week and students test marks in percentages. Label your scatterplot.



- c) What conclusion can you draw from your graph?

The more you play sports the more your grades drop

2 marks

- criteria 1 and 2 met

4 marks

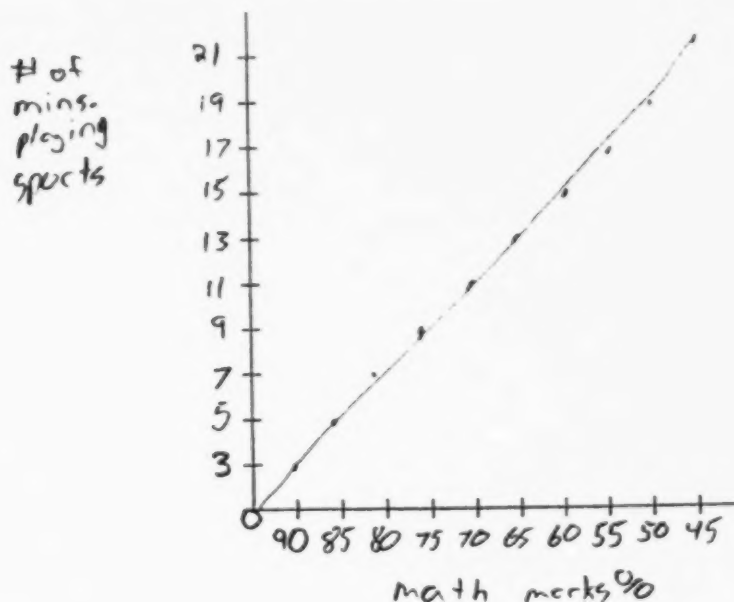
## 28. OPEN-RESPONSE QUESTION

You have been asked to collect data to determine whether there is a relationship between the amount of time students spend playing sports and their test marks in Senior 1 Mathematics.

- a) You have decided to use a representative sample of 20 students.  
Explain how you would choose your sample.

it is random people that you see

- b) Create a scatterplot that compares the number of hours playing sports per week and students test marks in percentages. Label your scatterplot.



- c) What conclusion can you draw from your graph?

The less you play sports in a week the higher your percentage will be in math.

1 mark

- criterion 4 met

4 marks

## Question No. 29

Specific Outcome: B.2 (RR/E)

### ◆ Question

3 marks

A researcher surveys high school students from one school.

He concludes that "80% of Manitobans believe that people should be able to have a driver's licence without restrictions at the age of 16".

- a) Name 2 biases that may have affected this conclusion.
- b) Based on the researcher's survey, write a more valid conclusion.

### ◆ Answer Key

a) Sample responses:

- only high school students were asked, not all Manitobans
- only one school was included
- do not know the sample size
- do not know the question asked
- do not know where the school is located

- b) 80% of students in one school believe 16-year-olds should be able to have an unrestricted license.

**OR** \_\_\_\_\_

There can be no conclusion on the belief of Manitobans based on this survey.

### Marking Key

**3 marks:**

- 1 mark for a bias in a)
- 1 mark for a different bias in a)
- 1 mark for correct answer in b)

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## Question No. 30

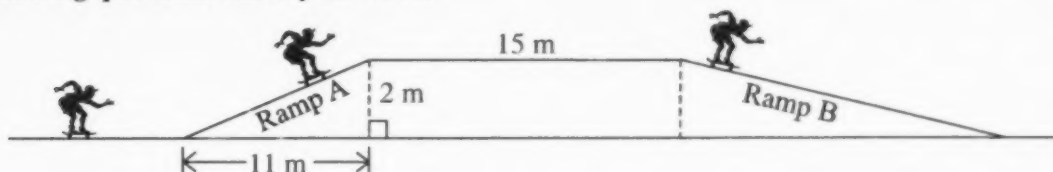
Specific Outcomes: F.2, I.3 and I.4 (OR)

### QUESTION AND ANSWER KEY

#### 30. OPEN-RESPONSE QUESTION

6 marks

A skateboard structure is shown below. Using the information on the diagram, answer the following questions. Show your work.



- a) What is the angle between ramp A and the ground?

$$\tan \theta = \frac{2}{11}$$
$$\theta = 10.3^\circ$$

- b) Choose an angle between ramp B and the ground which makes ramp B longer than ramp A.

Use this angle to calculate the length of ramp B using trigonometry.

Sample response (any angles less than  $10.3^\circ$ ):

$$\text{if the angle used is } 4^\circ \rightarrow \sin 4 = \frac{2}{x}$$
$$x = 28.7 \text{ m}$$

$$\text{if the angle used is } 8^\circ \rightarrow \sin 8 = \frac{2}{x}$$
$$x = 14.4 \text{ m}$$

- c) What is the total distance the skateboard travels from one end of the structure to the other end?

Sample response (Ramp A = 11.2):

$$\text{Distance} = 11.2 + 15 + 28.7 \text{ (or student answer in b)}$$
$$= 54.9 \text{ OR } 55 \text{ m}$$

## Scoring Rubric

|                                                | Score and<br>General Performance Indicators                                                                       | Specific Performance Indicators/Criteria |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <b>Level 1</b><br>limited<br>understanding     | <b>1</b><br>weak attempt                                                                                          | - one criterion met                      |
|                                                | <b>2</b><br>reasonable attempt, major errors or<br>omissions                                                      | - two criteria met                       |
| <b>Level 2</b><br>good<br>understanding        | <b>3</b><br>reasonable strategy, minor errors and/or<br>omissions                                                 | - three criteria met                     |
|                                                | <b>4</b><br>sound strategy, mostly<br>complete, minor errors                                                      | - four criteria met                      |
|                                                | <b>5</b><br>response complete with one minor error or<br>omission                                                 | - five criteria met                      |
| <b>Level 3</b><br>exceptional<br>understanding | <b>6</b><br>response complete, correct, showing<br>insightful thinking, critical thinking, or<br>a generalization | - all six criteria met                   |

### Criteria:

1. correct trigonometric ratio used in a)
2. correct angle of 10.3 in a) or correct angle based on student's ratio
3. angle in b) less than answer given in a)
4. correct trigonometric ratio to find the length of ramp B
5. correct length of ramp B based on student's ratio
6. total ramp distance based on student's correct calculation for Ramp A

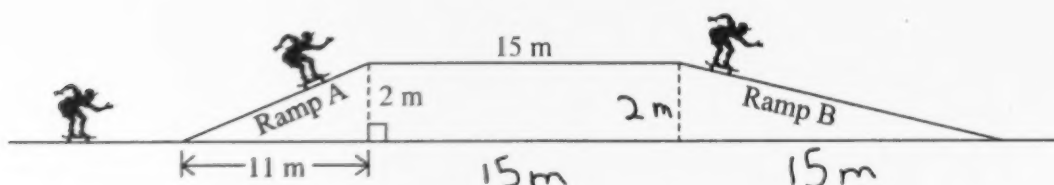
### Marker note(s):

- no deduction for rounding

# EXEMPLARS

## 30. OPEN-RESPONSE QUESTION

A skateboard structure is shown below. Using the information on the diagram, answer the following questions. Show your work.



- a) What is the angle between ramp A and the ground?

$$\tan A = \frac{2}{11}$$

$$\tan A = 0.18$$

$$\tan A = 10.3^\circ$$

The angle is  $10.3^\circ$ .

- b) Choose an angle between ramp B and the ground which makes ramp B longer than ramp A. Use this angle to calculate the length of ramp B using trigonometry.

$$\tan \theta = \frac{2}{15}$$

$$\tan \theta = 0.13$$

$$7.6^\circ$$

$$\sin 7.594643369 = \frac{2}{H}$$

$$0.13216372 = \frac{2}{H}$$

$$H = 15.13274596$$

the length of Ramp B is 15.1m.

- c) What is the total distance the skateboard travels from one end of the structure to the other end?

$$\sin \theta = \frac{0}{H}$$

$$\frac{0.178885438}{1} = \frac{2}{H}$$

$$11.1803399$$

$$15.1m$$

$$41.3$$

$$\sin 10.3^\circ = \frac{2}{H}$$

$$\frac{0.178885438}{1} = \frac{2}{H}$$

The total distance is 41.3m

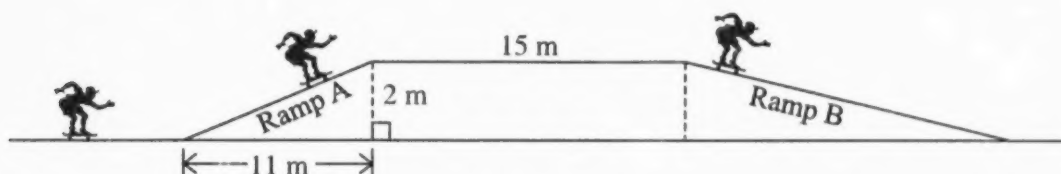
6 marks

- all criteria met

6 marks

### 30. OPEN-RESPONSE QUESTION

A skateboard structure is shown below. Using the information on the diagram, answer the following questions. Show your work.



- a) What is the angle between ramp A and the ground?

$$\frac{2}{11} = 0.182 \quad \tan^{-1}(0.182) \approx 10^\circ \quad \text{The angle between ramp A and the ground is about } 10^\circ.$$

- b) Choose an angle between ramp B and the ground which makes ramp B longer than ramp A. Use this angle to calculate the length of ramp B using trigonometry.

$$\angle \text{Ramp B} = 8^\circ$$

$$\begin{aligned} 2^2 + 15^2 &= \text{Ramp B}^2 \\ 4 + 225 &= 229 \\ \sqrt{229} &= 15.13 \text{ m} \end{aligned}$$

- c) What is the total distance the skateboard travels from one end of the structure to the other end?

Ramp A:

$$2^2 + 11^2 = \text{Ramp A}^2$$

$$4 + 121 = 125$$

$$\sqrt{125} = 11.2 \text{ m}$$

$$\begin{array}{r} 11.2 \text{ m} \\ 15.13 \text{ m} \\ + 15 \text{ m} \\ \hline 41.33 \text{ m} \end{array}$$

The skateboarder travels 41.33 m for one run.

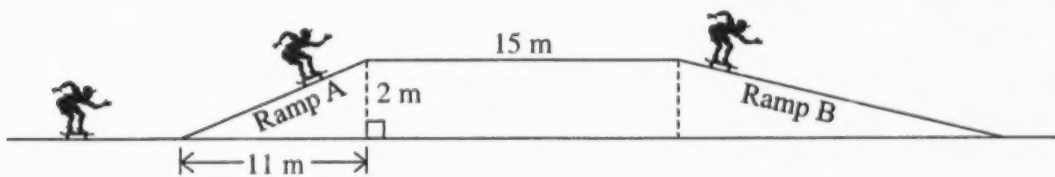
5 marks

- criteria 1, 2, 3, 5 and 6 met

6 marks

### 30. OPEN-RESPONSE QUESTION

A skateboard structure is shown below. Using the information on the diagram, answer the following questions. Show your work.



- a) What is the angle between ramp A and the ground?

$$\begin{aligned}\tan \theta &= \frac{2}{11} \\ \tan \theta &= \frac{2}{11} \\ \tan \theta &= 0.181818 \\ \angle X &= 10.3\end{aligned}$$

- b) Choose an angle between ramp B and the ground which makes ramp B longer than ramp A. Use this angle to calculate the length of ramp B using trigonometry.

- c) What is the total distance the skateboard travels from one end of the structure to the other end?

$$\begin{aligned}a^2 + b^2 &= c^2 \\ 2^2 + 11^2 &= x^2 \\ 4 + 121 &= 125 \\ x &= 11.2\end{aligned}$$

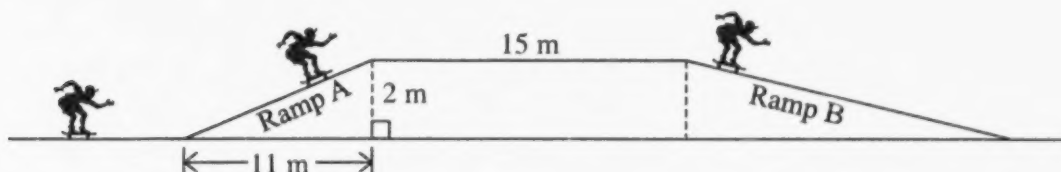
2 marks

- criteria 1 and 2 met

6 marks

### 30. OPEN-RESPONSE QUESTION

A skateboard structure is shown below. Using the information on the diagram, answer the following questions. Show your work.



- a) What is the angle between ramp A and the ground?

$$\tan = \frac{2}{11} \quad \tan^{-1} = 10.3^\circ$$

- b) Choose an angle between ramp B and the ground which makes ramp B longer than ramp A. Use this angle to calculate the length of ramp B using trigonometry.

- c) What is the total distance the skateboard travels **from one end of the structure to the other end**?

2 marks

- criteria 1 and 2 met

6 marks

## Question No. 31

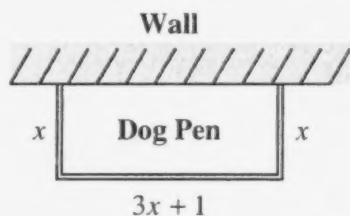
Specific Outcome: E.2 (RR)

### ◆ Question

2 marks

The total length of fence used to build three sides of a rectangular dog pen is 26 m.

- a) Write an equation to find the width ( $x$ ) of the pen.



- b) Solve your equation for  $x$ .

### ◆ Answer Key

a)  $x + 3x + 1 + x = 26$     **OR**     $5x + 1 = 26$

- b) (not including the wall)

$$5x + 1 - 1 = 26 - 1$$

$$\frac{5x}{5} = \frac{25}{5}$$

$$x = 5$$

### Marking Key

**2 marks:**

- 1 mark for correct equation in a)
- 1 mark for correct solution in b) based on student's equation in a) e.g.,  $x = 3$  (including the wall)

*Marker note(s):*

- *the answer for b) may appear in a) or vice-versa*

## Question No. 32

Specific Outcome: E.2 (RR/E)

### ♦ Question

3 marks

Joan and Alex were asked to solve the same equation. Their solutions are shown below.

Joan

$$4(x + 2) - 3 = x + 2$$

$$4x + 2 - 3 = x + 2$$

$$4x - 1 = x + 2$$

$$4x - x = 2 + 1$$

$$3x = 3$$

$$x = 1$$

Alex

$$4(x + 2) - 3 = x + 2$$

$$4x + 8 - 3 = x + 2$$

$$4x + 5 = x + 2$$

$$4x - x = 2 + 5$$

$$3x = 7$$

$$x = \frac{7}{3}$$

- a) Explain Joan's error.
- b) Explain Alex's error.
- c) Show the correct solution.

### ♦ Answer Key

- a) Joan did not multiply the 2 by 4.
- b) Alex did not subtract 5 from both sides.
- c) Correct solution:

$$4(x + 2) - 3 = x + 2$$

$$4x + 8 - 3 = x + 2$$

$$4x + 5 = x + 2$$

$$4x - x = 2 - 5$$

$$3x = -3$$

$$x = -1$$

### Marking Key

3 marks:

- 1 mark for explanation for Joan's error in a)
- 1 mark for explanation for Alex's error in b)
- 1 mark for correct solution

## Question No. 33

Specific Outcomes: G.1 and G.3 (RR/E)

### ◆ Question

3 marks

You see the following signs for two different raffles:

- a) If you bought one ticket from each team, what is the probability that you will win both prizes? Assume that all tickets are sold. Show your work.
- b) You decide to buy from only one team. Taking probability into consideration, from which team would you buy your ticket? Justify your choice.

### ◆ Answer Key

a)  $\frac{\text{Team A}}{500} \times \frac{\text{Team B}}{300} = \frac{1}{150\,000} \text{ (OR } 0.000\bar{6}\%)$

b) Sample answers:

Team A, because although the probability is lower  $\left(\frac{1}{500}\right)$  and the prize is lower (\$500), the tickets cost less, so it is cheaper to play.

OR

Team A, because I can buy 2 tickets for \$4 and then my chances are  $\left(\frac{1}{250}\right)$  (better than  $\frac{1}{300}$ ).

OR

Team B, because although the cost is more (\$4), the prize is higher (\$1000) and the probability of winning with one ticket is better  $\left(\frac{1}{300}\right)$ .

## Marking Key

**3 marks:**

- 1 mark for correct strategy in a)
- 1 mark for correct answer in a)
- 1 mark for correct justification in b)

*Marker note(s):*

- multiplication of independent events must be shown in a)
- correct justification must make some reference to probability

## Question No. 34

Specific Outcome: H.3 (RR)

### ◆ Question

3 marks

Below are three of the questions Robert completed on a powers and exponents quiz.

- Correct any errors Robert may have made.
- Circle any question(s) simplified correctly.

6.  $(x^2)(x^4) = x^8$

7.  $\frac{x^8}{x^{-4}} = x^{12}$

8.  $(x^5)^2 = x^7$

### ◆ Answer Key

6.  $x^6$

7. correct      must be circled or clearly identified

8.  $x^{10}$

### Marking Key

#### 3 marks:

- 1 mark for correcting error in 6
- 1 mark for recognizing 7 is correct
- 1 mark for correcting error in 8

#### Marker note(s):

- correctly explaining the error, such as "the exponents have been multiplied instead of added", is acceptable

## Question No. 35

Specific Outcomes: H.11 and H.10 (RR)

### ◆ Question

2 marks

- a) Simplify  $(x^2y)(4x^3y^3)$ .
- b) If  $x = -2$  and  $y = 1$ , evaluate your expression in a).

### ◆ Answer Key

- a)  $4x^5y^4$
- b)  $-128$

### Marking Key

**2 marks:**

- 1 mark for correct answer in a)
- 1 mark for correct answer in b)

*Marker note(s):*

- 1 mark awarded in b) for a correct evaluation of an incorrect answer in a)

## Question No. 36

Specific Outcome: H.13 (RR/E)

### ◆ Question

2 marks

- a) Determine the values of  $x$ .

$$x^2 = 225$$

- b) The area of a square patio is  $196 \text{ m}^2$ . Rahib is asked to find the length of the patio.

Rahib solves:

$$x^2 = 196$$

$$x = 14 \text{ or } -14$$

- So, the length of the patio is 14 or  $-14$ . Do you agree? Explain.

### ◆ Answer Key

- a)  $-15, 15$

- b) It is unreasonable to conclude that the length of a patio can be negative.

### Marking Key

**2 marks:**

- 1 mark for correct answer in a)
- 1 mark for correct explanation in b)

*Marker note(s):*

- *no mark in b) without a reasonable explanation*

## Question No. 37

Specific Outcome: C.1 (OR)

### QUESTION AND ANSWER KEY

#### 37. OPEN-RESPONSE QUESTION

4 marks

- a) Write any rational number, any integer and any whole number whose sum is  $-7.45$ .

Possible answers:

$$\begin{array}{|c|} \hline 0 \\ \hline \end{array} + \begin{array}{|c|} \hline -8 \\ \hline \end{array} + \begin{array}{|c|} \hline 0.55 \\ \hline \end{array} = -7.45$$

whole                      integer                      rational

$$\begin{array}{|c|} \hline 3 \\ \hline \end{array} + \begin{array}{|c|} \hline -10 \\ \hline \end{array} + \begin{array}{|c|} \hline -0.45 \\ \hline \end{array} = -7.45$$

whole                      integer                      rational

- b) • Give an example of a number that is not a rational number.  
• Explain why it is not rational.

Possible answers:

$\pi$ ,  $\sqrt{2}$ ,  $0.121\ 121\ 112\ \dots$

- It cannot be expressed as  $\frac{a}{b}$  (a fraction).

OR

- The decimal is non-terminating, non-repeating.

## Scoring Rubric

|                                             | Score and General Performance Indicators                                                                    | Specific Performance Indicators/Criteria |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------|
| <b>Level 1</b><br>limited understanding     | <b>1</b><br>weak attempt                                                                                    | - one criterion met                      |
| <b>Level 2</b><br>good understanding        | <b>2</b><br>reasonable strategy, minor errors and/or omissions                                              | - two criteria met                       |
|                                             | <b>3</b><br>response complete with one minor error or omission                                              | - three criteria met                     |
| <b>Level 3</b><br>exceptional understanding | <b>4</b><br>response complete, correct, showing insightful thinking, critical thinking, or a generalization | - all four criteria met                  |

*Criteria:*

1. correctly places a rational, integer and whole in a)
2. sum of  $-7.45$  in a)
3. correct example in b)
4. correct explanation in b)

# EXEMPLARS

## 37. OPEN-RESPONSE QUESTION

- a) Write any rational number, any integer and any whole number whose sum is  $-7.45$ .

$$\boxed{-2} + \boxed{-5} + \boxed{-.45} = -7.45$$

whole                      integer                      rational

- b) • Give an example of a number that is not a rational number.  
• Explain why it is **not** rational.

$\pi$  because  $\pi$  does not repeat or terminate.

3 marks

- criteria 2, 3 and 4 met

4 marks

### 37. OPEN-RESPONSE QUESTION

- a) Write any rational number, any integer and any whole number whose sum is  $-7.45$ .

$$\boxed{0} + \boxed{0} + \boxed{-7.45} = -7.45$$

whole                  integer                  rational

- b) • Give an example of a number that is not a rational number.  
 • Explain why it is **not** rational.

$4.3268406$  → It is a long decimal!

2 marks

- criteria 1 and 2 met

4 marks

37. OPEN-RESPONSE QUESTION

- a) Write any rational number, any integer and any whole number whose sum is  $-7.45$ .

$$\boxed{0} + \boxed{-7} + \boxed{0.45} = -7.45$$

whole                      integer                      rational

- b) • Give an example of a number that is not a rational number.  
• Explain why it is **not** rational.

3 is not rational because  
it is a whole number.

1 mark

- criterion 1 met

4 marks

## Question No. 38—Choice I only

Specific Outcome: D.1 (RR)

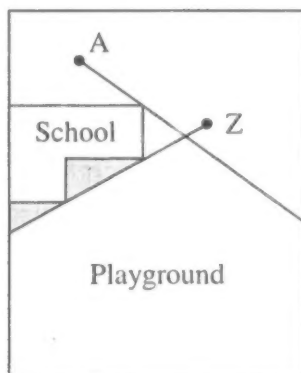
### ◆ Question

2 marks

Mrs. Able (A) and Mr. Zane (Z) are on playground duty.  
Maria wants to find a place to hide from the 2 teachers.

- Shade the region(s) on the playground where Maria may hide.

### ◆ Answer Key



### Marking Key

#### 2 marks:

- 1 mark for lines to indicate region
- 1 mark for shading both sections

#### Marker note(s):

- if correct region is shaded without the lines award full marks

## Question No. 39—Choice I only

Specific Outcome: D.2 (RR/E)

### ◆ Question

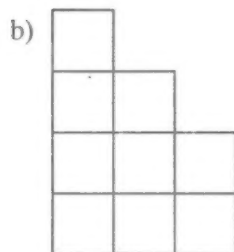
3 marks

The following is the base plan of a 3-D model.

- a) What is the total number of blocks you would see from the **right** view?
- b) Draw the **front** view of this model.
- c) Using 20 blocks show the base plan of a 3-D model that has the same front view as your answer in b).

### ◆ Answer Key

a) 8



c) Sample response:

|   |   |   |
|---|---|---|
| 3 |   | 2 |
| 2 | 3 | 2 |
| 4 | 2 | 2 |

Front

### Marking Key

**3 marks:**

- 1 mark for correct answer in a)
- 1 mark for correct answer in b)
- 1 mark for correct answer in c)

*Marker note(s):*

- *no mark deducted for not labelling "front" in c)*

# Question No. 38—Choice II only

Specific Outcome: K.1 (RR/E)

## Question

3 marks

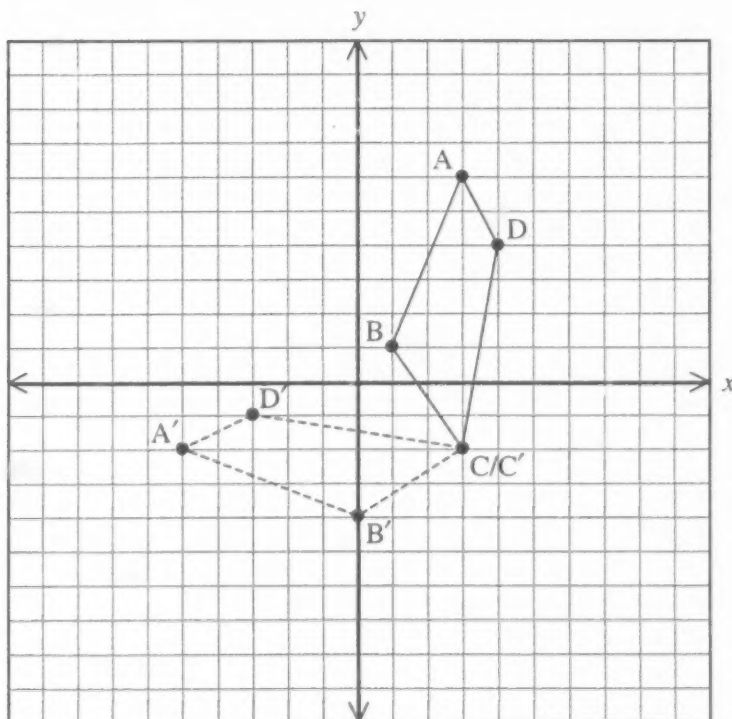
- Draw the image of the figure above rotated  $90^\circ$  counter-clockwise about point C.
- Write the coordinates for  $C'$ .

$C'(\quad, \quad)$

- Describe another transformation that would result in the same image.

## Answer Key

a)



b)  $C'(3, -2)$

c) A rotation of  $270^\circ$  clockwise about C.

## Marking Key

3 marks:

- 1 mark for correct answer in a)
- 1 mark for correct answer in b)
- 1 mark for correct answer in c)

Marker note(s):

- students are not expected to label the image

## Question No. 39—Choice II only

Specific Outcomes: K.1 and K.2 (RR)

### ◆ Question

2 marks

- a) Describe one or more **translations** of END that result in  $E'N'D'$  without crossing the barrier.
- b) Describe a combination of translations **and** reflections of END that results in the image  $E'N'D'$  without crossing the barrier.

### ◆ Answer Key

- a) Answers may vary.

Possible answer:

right 5, up 7

$(+5, +7)$

$(x + 5, y + 7)$

- b) Possible answer:

– reflect in y-axis, reflect in the line  $x = 2$ , translate 1 right, 7 up

### Marking Key

**2 marks:**

- 1 mark for correct answer in a)
- 1 mark for correct answer in b) which must include at least one translation and one reflection

*Marker note(s):*

- *when translations are used, direction and distance must be given*
- *when reflections are used, the reflection line must be indicated*
- *deduct a maximum of 1 mark for crossing the barrier*

# APPENDICES



# Appendix A

## SPECIFIC OUTCOME MATCH

| Selected-Response Questions |         |                     | Restricted-Response Questions                  |         |                     |            |
|-----------------------------|---------|---------------------|------------------------------------------------|---------|---------------------|------------|
| Question No.                | Unit(s) | Specific Outcome(s) | Question No.                                   | Unit(s) | Specific Outcome(s) | Mark Value |
| 1                           | A       | 1                   | 31                                             | E       | 2                   | 2          |
| 2                           | A/J     | 1/4                 | 34                                             | H       | 3                   | 3          |
| 3                           | B       | 4                   | 35                                             | H       | 11, 10              | 2          |
| 4                           | B       | 5                   | <i>Choice I</i>                                |         |                     |            |
| 5                           | C       | 1                   | 38                                             | D       | 1                   | 2          |
| 6                           | C       | 6                   | <i>Choice II</i>                               |         |                     |            |
| 7                           | C       | 8                   | 39                                             | K       | 1, 2                | 2          |
| 8                           | C       | 9                   | Restricted-Response with Explanation Questions |         |                     |            |
| 9                           | C       | 10                  | Question No.                                   | Unit(s) | Specific Outcome(s) | Mark Value |
| 10                          | E       | 2                   | 27                                             | A       | 1                   | 2          |
| 11                          | G       | 2                   | 29                                             | B       | 2                   | 3          |
| 12                          | G       | 3                   | 32                                             | E       | 2                   | 3          |
| 13                          | G       | 3                   | 33                                             | G       | 1, 3                | 3          |
| 14                          | H       | 1                   | 36                                             | H       | 12                  | 2          |
| 15                          | H       | 2                   | <i>Choice I</i>                                |         |                     |            |
| 16                          | H       | 3                   | 39                                             | D       | 2                   | 3          |
| 17                          | H       | 6                   | <i>Choice II</i>                               |         |                     |            |
| 18                          | H       | 12                  | 38                                             | K       | 1                   | 3          |
| 19                          | I/F     | 1/2                 | Open-Response Questions                        |         |                     |            |
| 20                          | I       | 2                   | Question No.                                   | Unit(s) | Specific Outcome(s) | Mark Value |
| 21                          | I       | 3                   | 26                                             | A       | 1                   | 4          |
| <i>Choice I</i>             |         |                     | 28                                             | B       | 1, 3, 4, 5, 6       | 4          |
| 22                          | D       | 1                   | 30                                             | F/I     | 2/3, 4              | 6          |
| 23                          | D       | 2                   | 37                                             | C       | 1                   | 4          |
| 24                          | D       | 1                   | <i>Choice I</i>                                |         |                     |            |
| 25                          | D       | 3                   | <i>Choice II</i>                               |         |                     |            |
| 22                          | K       | 1                   | <i>Choice II</i>                               |         |                     |            |
| 23                          | K       | 4                   | <i>Choice II</i>                               |         |                     |            |
| 24                          | K       | 3                   | <i>Choice II</i>                               |         |                     |            |
| 25                          | K       | 2                   | <i>Choice II</i>                               |         |                     |            |



## Appendix B

### DOUBLE MARKING RECORD SHEET

FIRST MARKING  
BOOKLET NO.

---

| Marker ID | Question | Score |
|-----------|----------|-------|
|           | 26       |       |
|           | 27       |       |
|           | 28       |       |
|           | 29       |       |
|           | 30       |       |
|           | 31       |       |
|           | 32       |       |
|           | 33       |       |
|           | 34       |       |
|           | 35       |       |
|           | 36       |       |
|           | 37       |       |
|           | 38       |       |
|           | 39       |       |
|           | Total    |       |

### DOUBLE MARKING RECORD SHEET

SECOND MARKING  
BOOKLET NO.

---

| Marker ID | Question | Score |
|-----------|----------|-------|
|           | 26       |       |
|           | 27       |       |
|           | 28       |       |
|           | 29       |       |
|           | 30       |       |
|           | 31       |       |
|           | 32       |       |
|           | 33       |       |
|           | 34       |       |
|           | 35       |       |
|           | 36       |       |
|           | 37       |       |
|           | 38       |       |
|           | 39       |       |
|           | Total    |       |



## Appendix C

### GENERATING STUDENT PROFILES—CHOICE I

#### Profile of Test Score by Question Type

| Question Type                        | Test Questions                                        | Total | ÷ Maximum | × 100 | = % |
|--------------------------------------|-------------------------------------------------------|-------|-----------|-------|-----|
| Selected Response                    | 1 to 25: __                                           |       | 25        |       |     |
| Restricted Response                  | 31 __, 34 __, 35 __, 38 __                            |       | 9         |       |     |
| Restricted Response with Explanation | 27 __, 29 __, 32 __, 33 __, 36 __, 39 __              |       | 16        |       |     |
| Open Response                        | 26 __, 28 __, 30 __, 37 __                            |       | 18        |       |     |
| <b>Example</b>                       |                                                       |       |           |       |     |
| Open Response                        | 26 <u>3</u> , 28 <u>2</u> , 30 <u>3</u> , 37 <u>1</u> | 9     | 18        | 0.5   | 50% |

#### Profile of Test Score by Curricular Strand

| Strand                     | Test Questions                                                          | Total | ÷ Maximum | × 100 | = % |
|----------------------------|-------------------------------------------------------------------------|-------|-----------|-------|-----|
| Shape and Space            | 19 to 25 __, 30 __, 38 __, 39 __                                        |       | 18        |       |     |
| Number                     | 2 __, 5 to 10 __, 14 to 18 __, 31 __, 32 __, 34 __, 35 __, 36 __, 37 __ |       | 28        |       |     |
| Statistics and Probability | 3 __, 4 __, 11 to 13 __, 28 __, 29 __, 33 __                            |       | 15        |       |     |
| Patterns and Relations     | 1 __, 26 __, 27 __                                                      |       | 7         |       |     |



## Appendix D

### GENERATING STUDENT PROFILES—CHOICE II

#### Profile of Test Score by Question Type

| Question Type                        | Test Questions                                      | Total | ÷ Maximum | × 100 | = % |
|--------------------------------------|-----------------------------------------------------|-------|-----------|-------|-----|
| Selected Response                    | 1 to 25: __                                         |       | 25        |       |     |
| Restricted Response                  | 31 __, 34 __, 35 __, 39 __                          |       | 9         |       |     |
| Restricted Response with Explanation | 27 __, 29 __, 32 __, 33 __,<br>36 __, 38 __         |       | 16        |       |     |
| Open Response                        | 26 __, 28 __, 30 __, 37 __                          |       | 18        |       |     |
| <b>Example</b>                       |                                                     |       |           |       |     |
| Open Response                        | 26 <u>3</u> , 28 <u>2</u> , 30 <u>3</u> 37 <u>1</u> | 9     | 18        | 0.5   | 50% |

#### Profile of Test Score by Curricular Strand

| Strand                     | Test Questions                                                                | Total | ÷ Maximum | × 100 | = % |
|----------------------------|-------------------------------------------------------------------------------|-------|-----------|-------|-----|
| Shape and Space            | 19 to 25 __, 30 __, 38 __,<br>39 __                                           |       | 18        |       |     |
| Number                     | 2 __, 5 to 10 __, 14 to 18 __,<br>31 __, 32 __, 34 __, 35 __,<br>36 __, 37 __ |       | 28        |       |     |
| Statistics and Probability | 3 __, 4 __, 11 to 13 __, 28 __,<br>29 __, 33 __                               |       | 15        |       |     |
| Patterns and Relations     | 1 __, 26 __, 27 __                                                            |       | 7         |       |     |

